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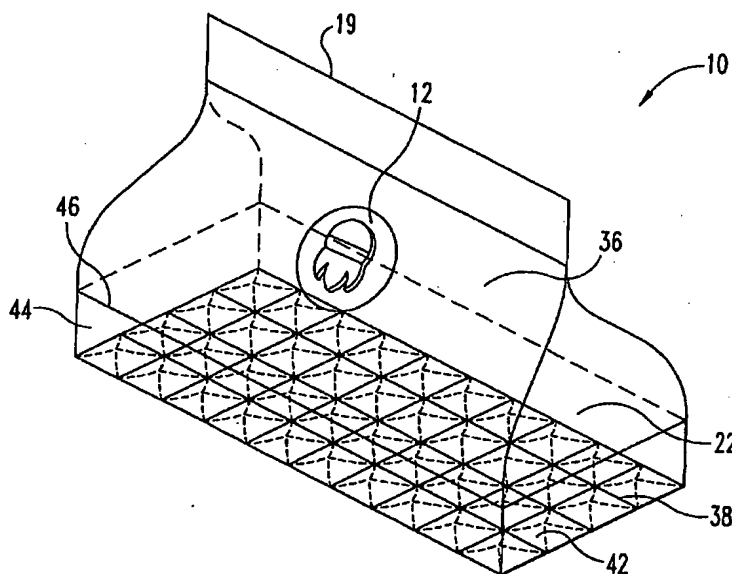
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(54) Title: MICROWAVE COOKING CONTAINER WITH VENTING ASSEMBLY



(57) Abstract: A device for improving steam cooking during the microwaving of food is described. A container (10) defines a compartment (22) containing a food product. A venting assembly (12) is operatively coupled to the container (10) and surrounds an aperture. The venting assembly (12) provides a controlled release of the steam that is trapped within the container (10). In one embodiment, the venting assembly (12) includes a base and a patch. The base defines a volume that covers the aperture formed in the container (10) and allows controlled venting upon an increase in pressure inside the container (10).

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## MICROWAVE COOKING CONTAINER WITH VENTING ASSEMBLY

### 5 CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of U.S. Provisional Application No. 60/498,021, filed August 27, 2003, which is incorporated herein by reference.

### 10 BACKGROUND OF THE INVENTION

The present invention relates to the field of cooking devices, and, more particularly, to cooking containers for use in a microwave oven for cooking meats, vegetables, and other food products.

15 Consumers often prefer to cook food in a microwave oven rather than conventional ovens because of the reduced cooking time required to heat foods in a microwave oven. Consumers also want to be provided with the opportunity to cook pre-packaged food products in the package in which they were purchased without the hassle of transferring the food from one container  
20 to the next.

Unfortunately, foods cooked in a microwave oven tend to be tough and/or dry in texture and consistency, rather than tender and moist. When liquid is added to the food in an attempt to retain moisture, the food can become soggy and undesirable. In addition, microwave ovens do not evenly  
25 distribute heat to the product being cooked. This results in a cooked food product that may be very hot in one area, but cold in another area. Because of these problems, many people consider microwave cooking to be problematic and generally undesirable.

One method for improving the texture and consistency of food  
30 cooked in a microwave oven is to use steam generated by the heated food product to assist in cooking the food. Cooking with steam not only provides moisture for the food being cooked, but also results in more consistent heating

throughout the food product.

Specifically, a container using the steam generated by the heated food product to assist in cooking the food takes advantage of the ideal gas law, a distillation of several kinetic theories including Boyle's Law and Gay-Lussac's Law. More specifically, such containers take advantage of the proportional relationship between pressure and temperature when volume and number of gas molecules remain constant. This proportional relationship can be expressed as a mathematical equation,  $(P_2/P_1) = (T_2/T_1)$ , where  $P_1$  is the initial pressure,  $P_2$  is the final pressure,  $T_1$  is the initial temperature, and  $T_2$  is the final temperature. Accordingly, any increase in pressure will result in a proportional increase in temperature that would not occur at ambient pressures. For example, if the pressure was to increase 1.2 fold (e.g., from 1 to 1.2 atmospheres), the temperature would also increase 1.2 fold (e.g., from 275 K to 330 K, which is an increase from 35°F to 134°F).

In order to steam cook a food product in a microwave oven, the steam must be retained within a cooking container; accordingly, the container must be at least partially sealed. When a sealed container is used to heat a food product contained therein, pressure rapidly builds as steam is generated from the heated food product. As heating continues, this pressure will continue to escalate until the container ruptures in some fashion, thereby relieving the pressure.

This relief often comes in the form of an explosion forcing an opening of the container and resulting in food being ejected therefrom. Not only does such an explosion create a mess, but it also undermines the attempt to use steam to cook the food product because the explosion causes a rapid release of the collected steam from the no longer sealed cooking environment.

The release of pressure can be controlled, for example, by providing vents along the edge of the base of the container, which is thereafter married to a covering. These vents create a weakened portion in the seal between the container's covering and its base. When the sealed

cooking environment attains a pressure creating a risk of explosion, the weakened portions in the seal allow for a controlled pressure release at the vents. The seal between the container's covering and its base is broken at the point where the pressure release occurs, creating a tab which may be grasped or otherwise used to pull the covering from the base, breaking the remainder of the seal such that consumption of the food product may occur. An example of such a venting configuration is described in commonly assigned U.S. Patent No. 6,559,431, which is incorporated in its entirety herein by reference.

Although this type of venting configuration is effective for steam cooking a food product in a microwave oven, it specifically requires vents to be molded along the edge of the base of the container being used. Additionally, this type of venting configuration can not be used in containers which lack a substantially rigid base, for example, cooking bags cannot be provided with this type of venting configuration.

It is therefore the paramount object of the present invention to provide a microwave cooking container with a venting assembly, wherein the container may be any microwave cooking container having a sealed cooking environment.

This and other objects and advantages of the present invention will become apparent upon a reading of the following description.

### DESCRIPTION-OF THE DRAWINGS

Figure 1 is a perspective view of a microwave cooking container with a venting assembly made in accordance with the present invention.

Figure 2 is an exploded perspective view of the venting assembly of Figure 1, including a venting disk and a patch.

Figure 2a is an enlarged perspective view of a portion the venting disk of Figure 2.

Figure 3a is a plan view of the venting disk of Figure 2.

Figure 3b is a cross sectional view of the venting disk taken along line A-A of Figure 3a.

Figure 3c is a cross sectional view of the venting disk taken along line B-B of Figure 3a.

Figure 3d is a perspective view of the venting disks of Figure 2.

Figure 4 is a perspective view of the assembled venting assembly of Figure 1.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention is a microwave cooking container 10 with a venting assembly 12, wherein the container may be any microwave cooking container having a sealed cooking environment. With reference to Figure 1, the container 10 includes at least one compartment 22 for retaining food product, at least one opening 19 for receiving food product, and at least one venting assembly 12. The container is composed of a material, such as polypropylene, that is transparent to radiant energy, such as energy from a microwave oven.

Although it is not necessary for practicing the present invention, the exemplary embodiment of the container 10 shown in the Figures includes an insert 38 having a floor 40 with a pattern. It has been found that certain patterns provide better steam cooking environments for certain types of foods. For example, a flat floor is good for foods with a high sugar content, such as desserts. For another example, as shown in Figure 1, a floor comprising a plurality of pyramid-shaped projections 42 raised therefrom provides a good cooking environment for foods with heavy sauces. Of course, many other raised floor patterns can be contemplated. Additionally, the insert 38 may include one or more side walls 44, which upwardly extending from the floor 40 and terminating at an upper edge 46. The floor insert 38 may also be sealed to the container 10 along the upper edge 46 to keep food product from becoming lodged between the inner wall of the container 10 and the side walls 44 of the floor insert 38 or beneath the insert 38.

Because the container 10 is being used to steam cook a food product, the steam must be retained within a container 10 while the food product is being prepared; accordingly, the container 10 must have a sealed cooking environment. A sealed cooking environment is one which has a

substantially fixed volume. Specifically, after food product has been delivered to the compartment 22, the opening 19 is sealed, thereby substantially fixing the volume of the container 10. The manner in which the opening 19 is sealed depends on the type of container 10 being used. For example, as shown in Figure 1, the container 10 could be a cooking bag having an opening 19 at the top end, in which case the opening 19 could be sealed using a heat seal or food grade adhesive. For another example, which is not shown, the container could be a cooking tray having a base with at least one compartment for holding food product and a covering, such as a snap-on lid or a flexible film, for sealing the opening to the compartment. Again, it is contemplated that any container having a sealed cooking environment could be used without departing from the spirit and scope of the present invention.

The venting assembly 12 of the present invention is designed to maintain the fixed volume of the container 10 until the pressure from the steam generated during heating increases to a point that it causes the venting assembly 12 to allow steam to exit the container 10 through at least one aperture 18 defined through a surface 36 of the container 10. With reference to Figure 2, the preferred venting assembly 12 includes a venting disk 14, which covers the apertures 18, and a patch 16, for securing the venting assembly 12 to the surface 36 of the container 10.

The venting disk 14 may be composed of, for example, polypropylene, and may be constructed using a variety of methods, for example, by thermoforming or die cut trimming. The venting disk 14 includes a base 26 and a steam pocket 20, which encloses a volume. As shown in Figure 2a, the pocket 20 is connected to the base 26 along only a portion of its periphery, such that a slot 28 remains between a separated portion 30 of the pocket 20 and the base 26.

Referring now to Figures 3a-3d, in the illustrated embodiment, the pocket 20 includes a roof 24 and a side wall 22, which extends downwardly from the roof 24 and connects the roof 24 to the base 26. Of course, the steam pocket 20 of the present invention could be comprised of an alternative



structural element, for example, a single dome-shaped wall. Also, the pocket 20 could take on any shape or size.

In any event, as shown in Figures 3a-3d, although the side wall 22 of the steam pocket 20 may be considered a single structural element, the side wall 22, as shown in Figures 3a-3d, can be described with reference to a plurality of discrete portions indicated by the reference numerals 22a, 22b, 22c, 22d, 22e, 22f and 22g.

The steam pocket 20 comprises at least one steam guide 62 and an associated pair of steam horns 72, 73. The steam guide 62 has a volume defined by a substantially V-shaped portion of the roof 24 and two wedge-shaped portions of the side wall 22d, 22e. The tips of the "wedges" and the "V" unite adjacent the base 26 of the disk 14. Similarly, the steam horns 72, 73, which are positioned on either side of the steam guide 62, each have a volume defined by a horn-shaped portion of the roof 24 and two wedge-shaped portions of the side wall 22b, 22c, 22f, 22g. The tips of the "wedges" and the "horns" unite adjacent the base 26 of the disk 14.

Referring now to Figure 2a, as mentioned above, the pocket 20 is connected to the base 26 along only a portion of its periphery, such that a slot 28 remains between the separated portion 30 of the pocket 20 and the base 26. In the illustrated embodiment, the pocket 20 is connected to the base 26 at the interface between the base 26 and the substantially semicircular portion of the sidewall indicated by the reference numeral 22a.

Turning now to the patch 16 of the venting assembly 10, the patch 16 may be composed of, for example, polypropylene, and may be constructed using a variety of methods, for example, by thermoforming or by die cut trimming. The patch 16 has an upper side 32, a lower side (not shown), and an inner edge 36 defining an opening 34 for receiving the pocket 20 of the venting disk 14. Specifically, as best illustrated by Figures 2, 2a, and 4, the inner edge 36 is fed into the slot 28 such that the separated portion 30 of the pocket 20 rests on the upper side 32 of the patch 16, while the remaining portion of the pocket 20 extends through the opening 34 and the lower side 32 of the patch 16

abuts the base 14 of the venting disk 14.

As best shown in Figures 3b and 3c, in the illustrated embodiment of the invention, the base 26 of the disk 14 is preferably somewhat concave. This concave shape pushes the patch 16 up against the separated portion 30 of the pocket 20. Alternatively, the separated portion 30 of the pocket 20 and the patch 16 may be held together, for example, by using a food-grade adhesive.

The associated disk 14 and patch 16, collectively referred to as the venting assembly 12, are positioned over the apertures 18 in the surface 36 of the container 10 such that the volume of the pocket 20 is placed in fluid communication with the interior of the container 10 via the apertures 18. The patch 16 is then secured to the surface 26 of the container 10, thereby securing the venting assembly 12 to the container 10. In this regard, the patch 16 covers a wider surface area than the disk 14 and, as such, extends beyond the base 26 of the disk 14 such that its lower side (not shown) abuts the surface 26 of the container 10 and is secured thereto using, for example, a heat seal or a food-grade adhesive. By securing the assembly 12 to the surface 36 and sealing the opening 19 of the container 10, a substantially fixed volume is created within the container 10.

As mentioned above, when the food product in the container 10 is prepared for consumption, the moisture from the food product creates steam as it approaches its boiling point. The steam generated causes the pressure within the container 10 to increase. As the pressure continues to build, the steam travels through the aperture 18 into the pocket 20. The steam and pressure within the pocket 20 eventually increases to a magnitude sufficient to lift the separated portion 30 of the pocket 20 away from the patch, thereby allowing venting of the container 10 to occur through the apertures 18. In the illustrated embodiment of the present invention, the guide 62 and the steam horns 72, 73 direct the steam and pressure to their tips. Thus, the pressure is heavily concentrated at the separated portion 30 of the pocket 20 thereby allowing venting of the container 10 to occur more effectively.

Although it is not illustrated in the accompanying figures, it is contemplated that the venting assembly could be used without the patch. In such an embodiment of the present invention, an aperture is defined through the surface of the container, which is capable of receiving the pocket of the venting disk. Specifically, the separated portion of the pocket is fed through the aperture and a portion of the surface of the container is retained within the slot such that the separated-portion of the pocket rests on an outer side of the surface of the container, while the remaining portion of the pocket extends through the aperture and the base of the venting disk abuts an inner side of the surface of the container. The disk is preferably somewhat concave such that it pushes the surface of the container up against the separated portion of the pocket. Alternatively, the separated portion of the pocket and the outer side of the surface of the container may be held together, for example, by using a food-grade adhesive.

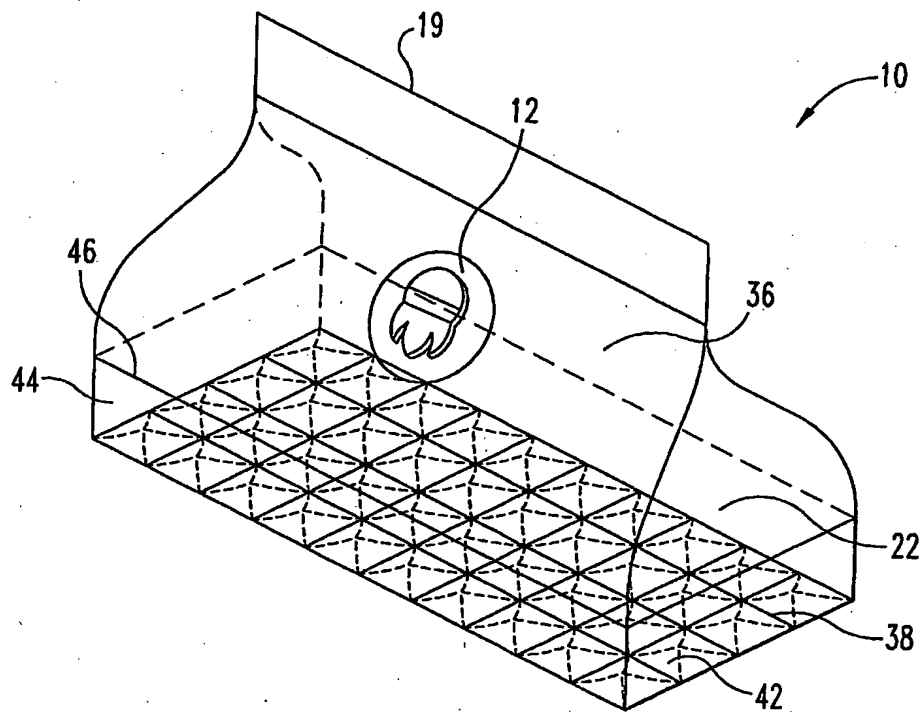
It will be obvious to those skilled in the art that other modifications may be made to the invention described herein without departing from the spirit and scope of the present invention.

**CLAIMS**

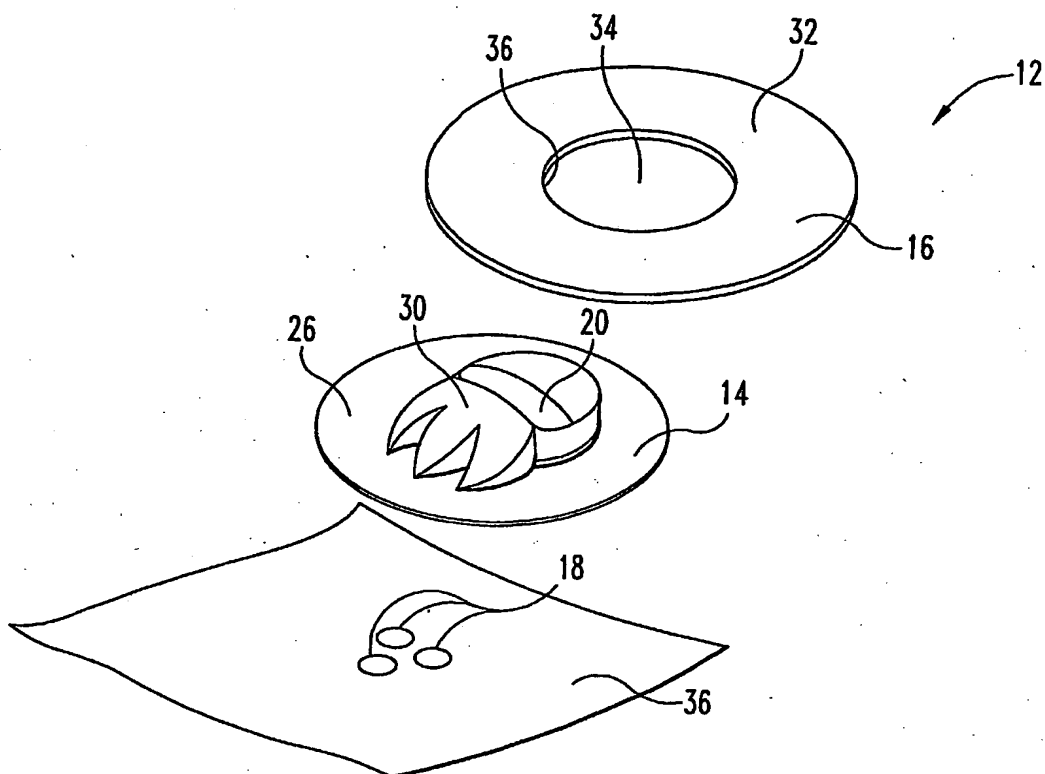
1. A device for steam cooking a food product during microwaving comprising:  
a microwavable container having a floor and sides defining at least one  
5 compartment and at least one sealable opening for receiving and holding a food  
product, the container further defining at least one aperture; and  
a venting assembly operatively coupled to the container surrounding the at  
least one aperture enabling controlled release of steam from the compartment.
- 10 2. The device of claim 1, further including an insert defining a pattern enclosed  
within the container.
3. The device of claim 2, wherein the pattern defined by the insert is generally flat.
- 15 4. The device of claim 2, wherein the pattern defined by the insert is a plurality of  
pyramid-shaped projections.
5. The device of claim 2, wherein the insert is operatively coupled to the floor of  
the container.
- 20 6. The device of claim 5, further including insert side walls extending upwardly  
from the floor of the container.
7. The device of claim 6, wherein the insert side walls are sealed to the side of the  
25 container.
8. The device of claim 1, the venting assembly including a venting disk and a  
patch.
- 30 9. The device of claim 8, wherein the venting disk is composed of polypropylene.

10. The device of claim 8, the venting disk including a base and a steam pocket.
11. The device of claim 10, the steam pocket including at least one steam guide and at least one steam horn.
- 5 12. The device of claim 11, wherein the steam horns define a substantially V shape.
- 10 13. The device of claim 8, wherein the patch operatively couples the venting disk to the container.
14. The device of claim 13, wherein the patch is coupled to the container using a heat seal.
- 15 15. The device of claim 13, wherein the patch is coupled to the container using a food grade adhesive.
16. A vented microwave container for steam cooking a food product contained therein comprising:
- 20 a venting disk including a base and a steam pocket, the steam pocket including at least one steam guide and at least one steam horn, wherein the steam pocket and guide and horn define a volume that surrounds the vent in the container, wherein the steam pocket is operatively coupled to the base for a portion of the periphery of the steam pocket and defines a slot for the remaining portion of the
- 25 periphery of the steam pocket.

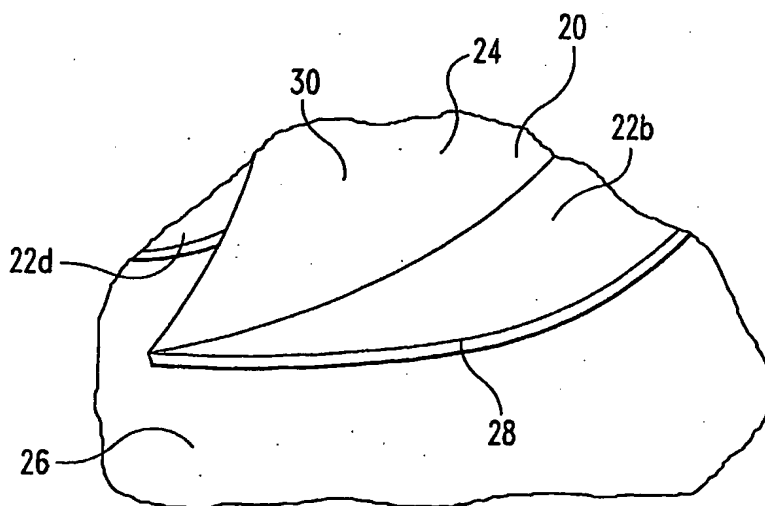
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**Fig. 1**

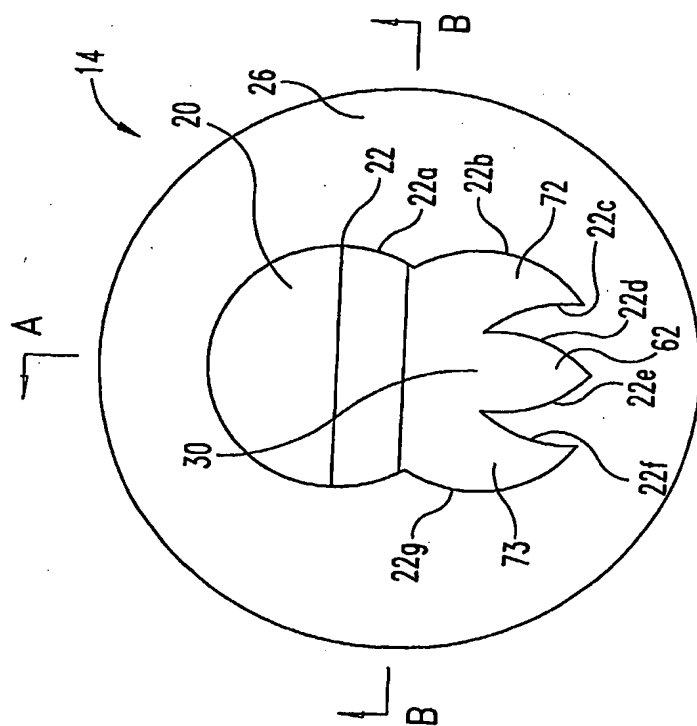


**Fig. 2**

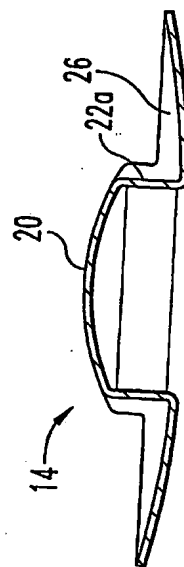


**Fig. 2a**

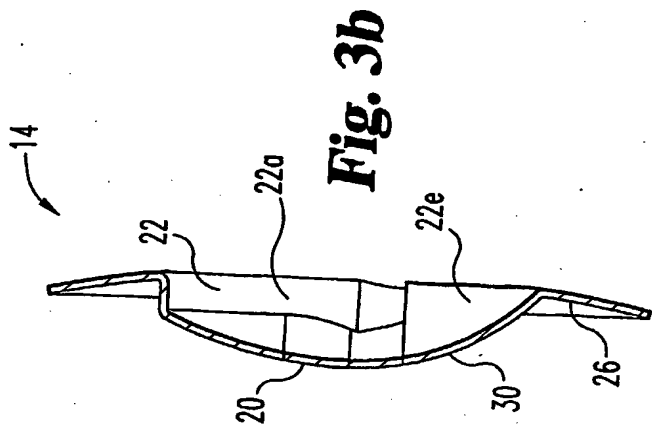
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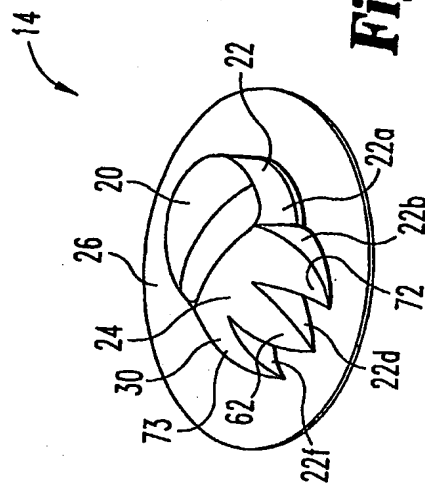
**Fig. 3a**



**Fig. 3c**

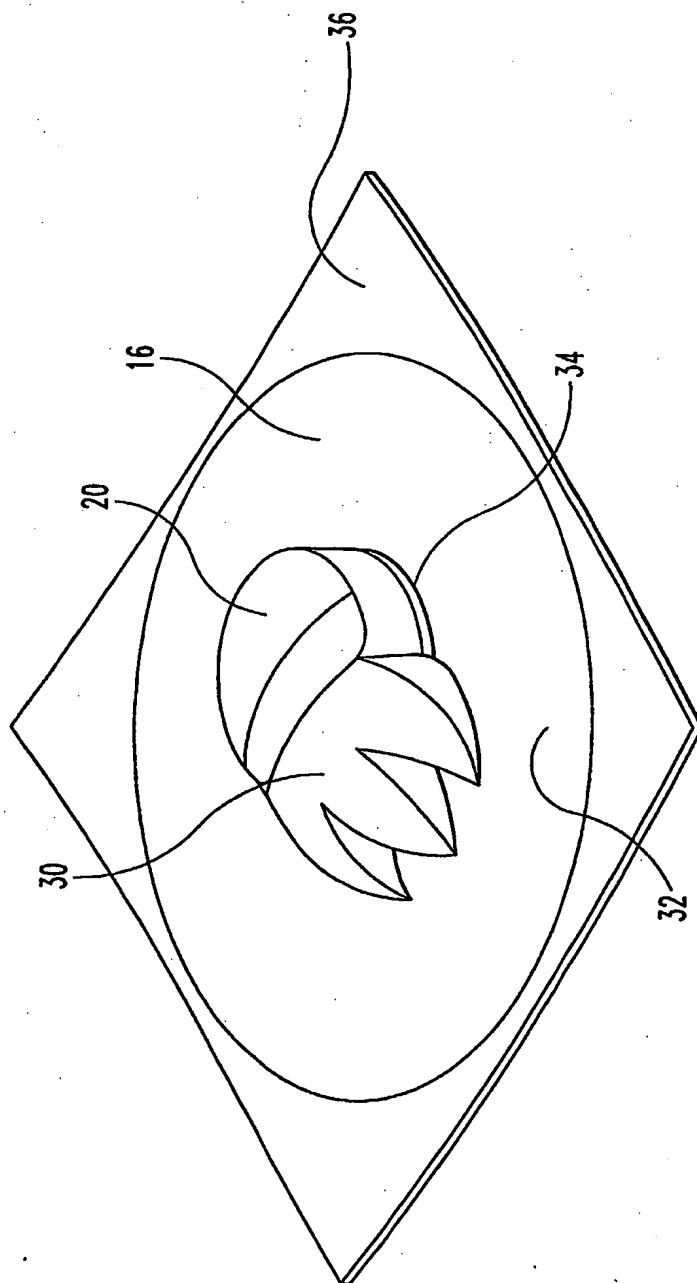


**Fig. 3b**



**Fig. 3d**





**Fig. 4**

# INTERNATIONAL SEARCH REPORT

International application No.

PCT/US04/14906

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) : H05B 6/80; B65D 81/34; A47J 27/08

US CL : 219/732, 735, 762; 426/118, 234; 99/Dig.14; 220/367.1

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 219/725-735, 762; 99/Dig.14; 426/107, 109, 113, 118, 234, 241, 243; 220/366.1-374; 229/902-904

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)  
Please See Continuation Sheet

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X — Y	JP 11-208737 A (TOPPAN PRINTING CO LTD) 03 August 1999 (03.08.99), Figures 1-3 and the English Abstract.	1 and 8-16 2-7
X — Y	JP 11-245971 A (TOPPAN PRINTING CO LTD) 14 September 1999 (14.09.99), Figures 1-3 and the English abstract.	1 and 8-16 2-7
X, P  Y  Y	US 6,660,983 B2 (MONFORTON et al) 09 December 2003 (09.12.03), Figures 1-6 and col. 7, line 11 - col. 8, line 4. US 5,310,977 A (STENKAMP et al) 10 May 1994 (10.05.94), Figures 5-7 and col. 7, line 36 - col. 8, line 24. US 6,097,017 A (PICKFORD) 01 August 2000 (01.08.00), Figures 1-9 and col. 3, line 48 - col. line 16.	1 2-7 2-7

☐ Further documents are listed in the continuation of Box C.

☐ See patent family annex.

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Date of the actual completion of the international search

16 September 2004 (16.09.2004)

Date of mailing of the international search report

19 NOV 2004

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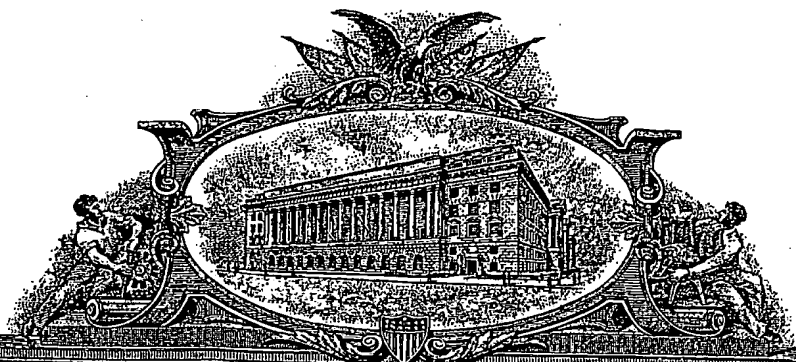
*Sheila H. Venev*  
Patent Specialist  
Tech. Center 3700

**INTERNATIONAL SEARCH REPORT**

International application No.  
PCT/US04/14906

Continuation of B. FIELDS SEARCHED Item 3:

EAST searched: (microwav\$5 or frequenc\$3) same (packag\$5 or container or vessel or dish\$3 or utens\$3 or cook\$5) same vent\$9



# THE UNITED STATES OF AMERICA

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July 26, 2004

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FILING DATE: August 27, 2003

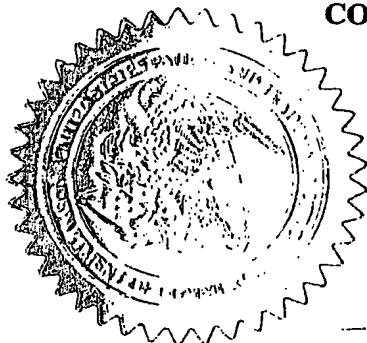
RELATED PCT APPLICATION NUMBER: PCT/US04/14906

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**PROVISIONAL APPLICATION FOR PATENT COVER SHEET**

This is a request for filing a PROVISIONAL APPLICATION FOR PATENT under 37 CFR 1.53(c).

Express Mail Label No. EV 256525279 US

INVENTOR(S)					
Given Name (first and middle (if any))		Family Name or Surname		Residence (City and either State or Foreign Country)	
Gary L.		Hopkins, Sr.		Scottsburg, Indiana	
Additional inventors are being named on the _____ separately numbered sheets attached hereto					
TITLE OF THE INVENTION (500 characters max)					
MICROWAVE COOKING CONTAINER WITH VENTING ASSEMBLY					
Direct all correspondence to: CORRESPONDENCE ADDRESS					
<input checked="" type="checkbox"/> Customer Number: 24350					
OR					
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METHOD OF PAYMENT OF FILING FEES FOR THIS PROVISIONAL APPLICATION FOR PATENT					
<input checked="" type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27.					
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15535 U.S. PTO  
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Respectfully submitted  
SIGNATURE *Mandy V. Wilson*  
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## 15

The present invention relates to the field of cooking devices, and, more particularly, to cooking containers for use in a microwave oven for cooking meats, vegetables, and other food products.

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One method for improving the texture and consistency of food cooked in a microwave oven is to use steam generated by the heated food product to assist in cooking the food. Cooking with steam not only provides moisture for the food being cooked, but also results in more consistent heating throughout the food product.

5           Specifically, a container using the steam generated by the heated food product to assist in cooking the food takes advantage of the ideal gas law, a distillation of several kinetic theories including Boyle's Law and Gay-Lussac's Law. More specifically, such containers take advantage of the proportional relationship between pressure and temperature when volume and number of gas molecules remain constant. This proportional relationship can be expressed as a  
10   mathematical equation,  $(P_2/P_1) = (T_2/T_1)$ , where  $P_1$  is the initial pressure,  $P_2$  is the final pressure,  $T_1$  is the initial temperature, and  $T_2$  is the final temperature. Accordingly, any increase in pressure will result in a proportional increase in temperature that would not occur at ambient pressures. For example, if the pressure was to increase 1.2 fold (e.g., from 1 to 1.2 atmospheres), the temperature would also increase 1.2 fold (e.g., from 275 K to 330 K, which is  
15   an increase from 35°F to 134°F).

          In order to steam cook a food product in a microwave oven, the steam must be retained within a cooking container; accordingly, the container must be at least partially sealed. When a sealed container is used to heat a food product contained therein, pressure rapidly builds as steam is generated from the heated food product. As heating continues, this pressure will continue to  
20   escalate until the container ruptures in some fashion, thereby relieving the pressure.

          This relief often comes in the form of an explosion forcing an opening of the container and resulting in food being ejected therefrom. Not only does such an explosion create a mess,

but it also undermines the attempt to use steam to cook the food product because the explosion causes a rapid release of the collected steam from the no longer sealed cooking environment.

The release of pressure can be controlled, for example, by providing vents along the edge of the base of the container, which is thereafter married to a covering. These vents create a weakened portion in the seal between the container's covering and its base. When the sealed cooking environment attains a pressure creating a risk of explosion, the weakened portions in the seal allow for a controlled pressure release at the vents. The seal between the container's covering and its base is broken at the point where the pressure release occurs, creating a tab which may be grasped or otherwise used to pull the covering from the base, breaking the remainder of the seal such that consumption of the food product may occur. An example of such a venting configuration is described in commonly assigned U.S. Patent No. 6,559,431, which is incorporated in its entirety herein by reference.

Although this type of venting configuration is effective for steam cooking a food product in a microwave oven, it specifically requires vents to be molded along the edge of the base of the container being used. Additionally, this type of venting configuration can not be used in containers which lack a substantially rigid base, for example, cooking bags cannot be provided with this type of venting configuration.

It is therefore the paramount object of the present invention to provide a microwave cooking container with a venting assembly, wherein the container may be any microwave cooking container having a sealed cooking environment.

This and other objects and advantages of the present invention will become apparent upon a reading of the following description.



## DESCRIPTION OF THE DRAWINGS

Figure 1 is a perspective view of a microwave cooking container with a venting assembly made in accordance with the present invention;

Figure 2 is an exploded perspective view of the venting assembly of Figure 1, including a  
5 venting disk and a patch;

Figure 2a is an enlarged perspective view of a portion the venting disk of Figure 2;

Figure 3a is a plan view of the venting disk of Figure 2;

Figure 3b is a cross sectional view of the venting disk taken along line A-A of Figure 3a;

Figure 3c is a cross sectional view of the venting disk taken along line B-B of Figure 3a;

10 Figure 3d is a perspective view of the venting disks of Figure 2; and

Figure 4 is a perspective view of the assembled venting assembly of Figure 1.

## DETAILED DESCRIPTION OF THE INVENTION

The present invention is a microwave cooking container 10 with a venting assembly 12,  
15 wherein the container may be any microwave cooking container having a sealed cooking  
environment. With reference to Figure 1, the container 10 includes at least one compartment 22  
for retaining food product, at least one opening 19 for receiving food product, and at least one  
venting assembly 12. The container is composed of a material, such as polypropylene, that is  
transparent to radiant energy, such as energy from a microwave oven.

20 Although it is not necessary for practicing the present invention, the exemplary  
embodiment of the container 10 shown in the Figures includes an insert 38 having a floor 40  
with a pattern. It has been found that certain patterns provide better steam cooking environments  
for certain types of foods. For example, a flat floor is good for foods with a high sugar content,

such as desserts. For another example, as shown in Figure 1, a floor comprising a plurality of pyramid-shaped projections 42 raised therefrom provides a good cooking environment for foods with heavy sauces. Of course, many other raised floor patterns can be contemplated.

5 Additionally, the insert 38 may include one or more side walls 44, which upwardly extending from the floor 40 and terminating at an upper edge 46. The floor insert 38 may also be sealed to the container 10 along the upper edge 46 to keep food product from becoming lodged between the inner wall of the container 10 and the side walls 44 of the floor insert 38 or beneath the insert 38.

10 Because the container 10 is being used to steam cook a food product, the steam must be retained within a container 10 while the food product is being prepared; accordingly, the container 10 must have a sealed cooking environment. A sealed cooking environment is one which has a substantially fixed volume. Specifically, after food product has been delivered to the compartment 22, the opening 19 is sealed, thereby substantially fixing the volume of the container 10. The manner in which the opening 19 is sealed depends on the type of container 10  
15 being used. For example, as shown in Figure 1, the container 10 could be a cooking bag having an opening 19 at the top end, in which case the opening 19 could be sealed using a heat seal or food grade adhesive. For another example, which is not shown, the container could be a cooking tray having a base with at least one compartment for holding food product and a covering, such as a snap-on lid or a flexible film, for sealing the opening to the compartment. Again, it is  
20 contemplated that any container having a sealed cooking environment could be used without departing from the spirit and scope of the present invention.

The venting assembly 12 of the present invention is designed to maintain the fixed volume of the container 10 until the pressure from the steam generated during heating increases

to a point that it causes the venting assembly 12 to allow steam to exit the container 10 through at least one aperture 18 defined through a surface 36 of the container 10. With reference to Figure 2, the preferred venting assembly 12 includes a venting disk 14, which covers the apertures 18, and a patch 16, for securing the venting assembly 12 to the surface 36 of the container 10.

The venting disk 14 may be composed of, for example, polypropylene, and may be constructed using a variety of methods, for example, by thermoforming or die cut trimming. The venting disk 14 includes a base 26 and a steam pocket 20, which encloses a volume. As shown in Figure 2a, the pocket 20 is connected to the base 26 along only a portion of its periphery, such that a slot 28 remains between a separated portion 30 of the pocket 20 and the base 26.

Referring now to Figures 3a-3d, in the illustrated embodiment, the pocket 20 includes a roof 24 and a side wall 22, which extends downwardly from the roof 24 and connects the roof 24 to the base 26. Of course, the steam pocket 20 of the present invention could be comprised of an alternative structural element, for example, a single dome-shaped wall. Also, the pocket 20 could take on any shape or size.

In any event, as shown in Figures 3a-3d, although the side wall 22 of the steam pocket 20 may be considered a single structural element, the side wall 22, as shown in Figures 3a-3d, can be described with reference to a plurality of discrete portions indicated by the reference numerals 22a, 22b, 22c, 22d, 22e, 22f and 22g.

The steam pocket 20 comprises at least one steam guide 62 and an associated pair of steam horns 72, 73. The steam guide 62 has a volume defined by a substantially V-shaped portion of the roof 24 and two wedge-shaped portions of the side wall 22d, 22e. The tips of the "wedges" and the "V" unite adjacent the base 26 of the disk 14. Similarly, the steam horns 72,

73, which are positioned on either side of the steam guide 62, each have a volume defined by a horn-shaped portion of the roof 24 and two wedge-shaped portions of the side wall 22b, 22c, 22f, 22g. The tips of the "wedges" and the "horns" unite adjacent the base 26 of the disk 14.

Referring now to Figure 2a, as mentioned above, the pocket 20 is connected to the base 26 along only a portion of its periphery, such that a slot 28 remains between the separated portion 30 of the pocket 20 and the base 26. In the illustrated embodiment, the pocket 20 is connected to the base 26 at the interface between the base 26 and the substantially semicircular portion of the sidewall indicated by the reference numeral 22a.

Turning now to the patch 16 of the venting assembly 10, the patch 16 may be composed of, for example, polypropylene, and may be constructed using a variety of methods, for example, by thermoforming or by die cut trimming. The patch 16 has an upper side 32, a lower side (not shown), and an inner edge 36 defining an opening 34 for receiving the pocket 20 of the venting disk 14. Specifically, as best illustrated by Figures 2, 2a, and 4, the inner edge 36 is fed into the slot 28 such that the separated portion 30 of the pocket 20 rests on the upper side 32 of the patch 16, while the remaining portion of the pocket 20 extends through the opening 34 and the lower side 32 of the patch 16 abuts the base 14 of the venting disk 14.

As best shown in Figures 3b and 3c, in the illustrated embodiment of the invention, the base 26 of the disk 14 is preferably somewhat concave. This concave shape pushes the patch 16 up against the separated portion 30 of the pocket 20. Alternatively, the separated portion 30 of the pocket 20 and the patch 16 may be held together, for example, by using a food-grade adhesive.

The associated disk 14 and patch 16, collectively referred to as the venting assembly 12, are positioned over the apertures 18 in the surface 36 of the container 10 such that the volume of

the pocket 20 is placed in fluid communication with the interior of the container 10 via the apertures 18. The patch 16 is then secured to the surface 26 of the container 10, thereby securing the venting assembly 12 to the container 10. In this regard, the patch 16 covers a wider surface area than the disk 14 and, as such, extends beyond the base 26 of the disk 14 such that its lower  
5 side (not shown) abuts the surface 26 of the container 10 and is secured thereto using, for example, a heat seal or a food-grade adhesive. By securing the assembly 12 to the surface 36 and sealing the opening 19 of the container 10, a substantially fixed volume is created within the container 10.

As mentioned above, when the food product in the container 10 is prepared for  
10 consumption, the moisture from the food product creates steam as it approaches its boiling point. The steam generated causes the pressure within the container 10 to increase. As the pressure continues to build, the steam travels through the aperture 18 into the pocket 20. The steam and pressure within the pocket 20 eventually increases to a magnitude sufficient to lift the separated portion 30 of the pocket 20 away from the patch, thereby allowing venting of the container 10 to  
15 occur through the apertures 18. In the illustrated embodiment of the present invention, the guide 62 and the steam horns 72, 73 direct the steam and pressure to their tips. Thus, the pressure is heavily concentrated at the separated portion 30 of the pocket 20 thereby allowing venting of the container 10 to occur more effectively.

Although it is not illustrated in the accompanying figures, it is contemplated that the  
20 venting assembly could be used without the patch. In such an embodiment of the present invention, an aperture is defined through the surface of the container, which is capable of receiving the pocket of the venting disk. Specifically, the separated portion of the pocket is fed through the aperture and a portion of the surface of the container is retained within the slot such

that the separated portion of the pocket rests on an outer side of the surface of the container, while the remaining portion of the pocket extends through the aperture and the base of the venting disk abuts an inner side of the surface of the container. The disk is preferably somewhat concave such that it pushes the surface of the container up against the separated portion of the pocket. Alternatively, the separated portion of the pocket and the outer side of the surface of the container may be held together, for example, by using a food-grade adhesive.

It will be obvious to those skilled in the art that other modifications may be made to the invention described herein without departing from the spirit and scope of the present invention.

## SAMPLE CLAIMS

1. A self-venting microwave cooking device for steam cooking a food product contained therein, comprising:

5 a container enclosing a substantially fixed volume and having a surface defining at least one aperture for facilitating venting of the container during steam cooking; and

a venting assembly, including

a venting disk having a base and a pocket having a periphery and enclosing a volume that is in fluid communication with the interior of the container via the at  
10 least one aperture, the pocket being connected to the base along only a portion of its periphery, such that a slot remains between a separated portion of the pocket and the base; and

a patch for securing the venting assembly to the surface of the container, the patch having an upper side, a lower side, and an opening for receiving the pocket such that the separated portion of the pocket rests against the upper side of the patch until pressure from  
15 steam generated during steam cooking increases to a magnitude sufficient to lift the separated portion of the pocket away from the patch, thereby allowing venting of the container to occur through the at least one aperture.

2. A self-venting assembly for a microwave cooking container for steam cooking a  
20 food product contained therein, comprising:

a venting disk having a base and a pocket having a periphery and enclosing a volume that is in fluid communication with the interior of the container via the aperture, the pocket being connected to the base along only a portion of its periphery, such that a slot remains between a separated portion of the pocket and the base, the aperture for receiving the pocket.

## DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled MICROWAVE COOKING CONTAINER WITH VENTING ASSEMBLY, the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, Section 1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, Section 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

Prior Foreign Application(s)

Priority claimed

NONE

(Number) (Country) (Day/Month/Year filed)

Yes No

I hereby claim the benefit under Title 35, United States Code, Section 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code Section 112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, Section 1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

NONE

(Appn. Serial No.)

(Filing Date)

(Status)  
(patented, pending,  
abandoned)

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001

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of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

And I hereby appoint the practitioners at Customer Number 24350 as my attorneys to prosecute this application and to transact all business in the U.S. Patent and Trademark Office connected therewith, and I request that all communications concerning this application be addressed to Mandy V. Wilson, Stites & Harbison, PLLC, 400 West Market Street, Suite 1800, Louisville, Kentucky 40202-3352, telephone (502) 587-3400.

Full name of sole inventor Gary L. Hopkins, Sr.

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Note: This Declaration and Power of Attorney may be executed only when attached to the specification (including claims) as the last page thereof.

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